

REMARKS

This Amendment is filed in response to the Office Action mailed on January 27, 2006. All objections and rejections are respectfully traversed.

Claims 1-22, 38, 40-41, 43-44, 46, 55-81 are currently pending.

Claim 80 to 81 are added to better claim the invention.

Claim Rejections – 35 USC § 102

At paragraphs 4-5 of the Office Action, claims 1, 3, 8-12, 14-22, 55-58, and 61-79 are rejected under 35 U.S.C. §102 as being anticipated by Stallmo et al., US Patent No. 6,052,759, issued on April 18, 2000, hereinafter Stallmo.

The present invention, as set forth in representative claim 1, comprises in part:

1. A method for enabling parity declustering in a balanced parity array of a storage system, where an operating system performs the method comprising the steps of:

combining a plurality of unbalanced stripe arrays, each unbalanced stripe array storing an unequal number of parity blocks per disk, to form the balanced array, the balanced array storing substantially the same number of parity blocks on all disks, each unbalanced stripe array having parity blocks on a set of storage devices that are disjoint from a set of storage devices storing data blocks; and

distributing assignment of storage devices to parity groups throughout the balanced array.

By way of background, Stallmo describes a redundant array of independent disks (RAID) system for organizing data across the array when disks are added and removed. The system allows for a varying number of data blocks on different disks. When multiple

disks are managed, they are organized into multiple “rectangles” where each rectangle has a set of disks that all contain the same number of blocks. (Col. 8, lines 45-51). If there is remaining disk space on a disk, part of the disk space is part of a 2nd or 3rd rectangle. (Col. 8, lines 53-65)

Applicant respectfully urges that Stallmo does not describe Applicant’s novel *combining a plurality of unbalanced stripe arrays, each unbalanced stripe array storing an unequal number of parity blocks per disk, to form the balanced array, the balanced array storing substantially the same number of parity blocks on all disks ... distributing assignment of storage devices to parity groups throughout the balanced array*. Stallmo is totally silent concerning combining parity groups (*unbalanced parity arrays*). Stallmo is only organizing disks of the same size (same number of blocks per disk) into rectangles. Applicant’s claimed invention allows for both the number of parity blocks and the data blocks to be same across all disks.

In further detail, an *unbalanced parity array* has parity blocks on a set of disks. A parity group is a set of disks from which one or more parity sets are selected. Stallmo does not describe combining a plurality of unbalanced parity arrays into a balanced array. Stallmo describes organizing disk and not combining stripes into a balanced rectangle.

Additionally, Applicant’s claimed invention distributes the assignment of disks to parity groups throughout the combined balanced array such that all disks contain the same amount of data or parity information. Additionally, the parity assignment technique changes the parity group association of data blocks of a data disk with respect to other data blocks of data disks of the array. In contrast, Stallmo describes striping a single application’s data across all the managed disks. In following, the teaching of Stallmo, the data and parity information would be stored across all blocks instead of having data disk

and parity disks as claimed in Applicant's invention by *each unbalanced stripe array having parity blocks on a set of storage devices that are disjoint from a set of storage devices storing data blocks*. Stallmo does not describe distributing assignments to different storage devices for each storage device to store parity blocks in different parity groups across the balanced array.

Accordingly, Applicant respectfully urges that Stallmo is legally insufficient to anticipate the present claims under 35 U.S.C. §102 because of the absence of the Applicant's claimed novel *combining a plurality of unbalanced stripe arrays, each unbalanced stripe array storing an unequal number of parity blocks per disk, to form the balanced array, the balanced array storing substantially the same number of parity blocks on all disks ... distributing assignment of storage devices to parity groups throughout the balanced array*.

At paragraph 6 of the office Action, claims 38, 40-41, 43-44, and 46 were rejected under 35 U.S.C. §102 as being anticipated by Burton et al. US Patent Application Publication 2003/0074527, filed on April 17, 2003.

The present invention, as set forth in representative claim 38, comprises in part:

38. A method for declustering a parity array having a plurality of storage devices, where an operating system performs the method comprising the steps of:

assigning a first plurality of data and parity blocks to a first parity group; and

assigning a second plurality of data and parity blocks to a second parity group, the first and second parity groups being independent from each other and distributed throughout the plurality of storage devices of the parity array; and

combining the first parity group and the second parity group to a balanced array, the balanced array storing substantially the same number of blocks on all disks.

By way of background, Burton describes a system for a user to create a span of disks. The system wants a balanced number of disks in each span to maximize cache utilization. With more disks per span, fewer stripes are necessary to store all the cache information.

Applicant respectfully urges that Burton does not describe ***combining the first parity group and the second parity group to a balanced array, the balanced array storing substantially the same number of blocks on all disks.*** In further detail, each parity group in Applicant's claimed invention is a set of disks from which one or more parity sets are selected. Then, Applicant claims combining the two parity groups (or more parity groups) together to cause a balanced number of blocks per disk across all disks (balanced array) . In contrast, Burton only describes balancing the number of disks in each span and not combining parity groups to form a balanced array with approximately the same number of blocks per all disks.

Accordingly, Applicant respectfully urges that Burton is legally insufficient to anticipate the present claims under 35 U.S.C. §102 because of the absence of the Applicant's claimed novel ***combining the first parity group and the second parity group to a balanced array, the balanced array storing substantially the same number of blocks on all disks.***

Claim Rejections -35 USC § 103

At paragraph 7 of the Office Action, claims 2, and 4-6 were rejected under 35 U.S.C. §103 as being unpatentable over Stallmo, in view of Baylor et al., US Patent No. 5,862,158, hereinafter Baylor.

At paragraph 8 of the Office Action, claims 7, 13, and 59-60 were rejected under 35 U.S.C. §103 as being unpatentable over Stallmo, in view of Baylor, and in further view of Karr, US Patent No. 3,993,862, hereinafter Karr.

Applicant respectfully notes that claims 2, 4-7, 13, and 59-60 are dependent claims that depend from independent claims believed to be in condition for allowance. Accordingly, claims 2, 4-7, 13, and 59-60 are also believed to be in condition for allowance.

In the event that the Examiner deems personal contact desirable in the disposition of this case, the Examiner is encouraged to call the undersigned attorney at (617) 951-3067.

All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims.

The Applicant respectfully solicits favorable action.

Please charge any additional fee occasioned by this paper to our Deposit Account

No. 03-1237.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Shannen C. Delaney", written over a horizontal line.

Shannen C. Delaney

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